

MISCELLANEOUS FIELD STUDIES MAP FOLIO OF THE TALKEETNA QUAD., ALASKA

Preparation and analysis of samples

The heavy-mineral concentrates were preliminarily

Stream-sediment and glacial debris samples were air dried and sieved through a -80 mesh (0.2 mm) screen. A split of the -80 mesh material was analyzed for 30 elements including chromium and nickel by the semiquantitative spectrographic method of Grimes and Marranzino

(1968).

EXPLANATION FOR GENERALIZED GEOLOGIC MAP

[Geology generalized from Reed and Nelson (1977)]

CORRELATION OF MAP UNITS

SURFICIAL DEPOSITS

SEDIMENTARY AND VOLCANIC ROCKS

Qs } QUATERNARY

MESOZOIC AND (OR) UPPER PALEOZOIC

PENNSYLVANIAN

UPPER PALEOZOIC

LOWER PALEOZOIC

SURFICIAL DEPOSITS

SEDIMENTARY AND VOLCANIC ROCKS

MARINE SEDIMENTARY ROCKS, UNDIVIDED

LIMESTONE-CHERT CONGLOMERATE

Pzus SEDIMENTARY ROCKS (FLYSCH), UNDIVIDED

SHALE AND LIMESTONE

Tf GRANODIORITE OF FORAKER PLUTON

MzPzu ULTRAMAFIC ROCKS, UNDIVIDED

INTRUSIVE ROCKS, UNDIVIDED

SEDIMENTARY AND VOLCANIC ROCKS, UNDIVIDED

SEDIMENTARY AND VOLCANIC ROCKS, UNDIVIDED

SEDIMENTARY ROCKS, UNDIVIDED--Chiefly limestone

Pzsv METAMORPHOSED SEDIMENTARY AND VOLCANIC ROCKS, UNDIVIDED

Tmk | McKINLEY SEQUENCE Chiefly quartz monzonite and granite

TKi INTRUSIVE ROCKS, UNDIVIDED--Chiefly granodiorite and quartz diorite

Contact, dashed where approximately located, dotted where concealed

Fault, dashed where approximately located, dotted where concealed

EXPLANATION FOR GEOCHEMICAL SYMBOLS

and is explained on histograms

Heavy-mineral concentrate

Stream sediment or glacial debris

Nonmagnetic heavy-mineral concentrate

Stream sediment or glacial debris

values were not considered anomalous

Stream sediment and nonmagnetic heavy-mineral

DISCUSSION

sance geochemical studies made in the Talkeetna quad-

rangle, Alaska in 1975 and 1976 as part of the

Mineral Resource Assessment Program. The two maps

show the distribution of chromium and nickel in 943

-80 mesh stream sediment and glacial debris samples

and 812 nonmagnetic heavy-mineral concentrates from

stream sediment. The maps also show chromium and

nickel results for 70 stream seliment samples col-

lected by Reed and Elliot (1970) in the western part

of the quadrangle and in 106 stream sediment samples

collected by Clark and Hawley (1968) in the central

part of the quadrangle (Dutch Hills and Peters Hills

area). All of these data are plotted on base maps

small open and closed circles and by small crosses;

the small open circles denote sites where only stream

sediment or glacial debris was collected, the closed

circles denote sites where both stream sediments and

heavy-mineral concentrates were collected, and the

small crosses denote sites where only heavy-mineral

concentrates were collected. Anomalous chromium and

nickel values, as defined on the accompanying histo-

grams, are shown as follows: large circles represent

triangles represent anomalous values in nonmagnetic

that do not coincide with either large open circles

heavy-mineral concentrates. Sample site symbols

or triangles represent sites at which the samples

contained less than anomalous amounts of chromium

Description of sample media

In most places, stream sediments and heavy-

channels of swift mountain streams draining areas

ranging from about 5 to 10 km^2 . The sediment in

sediment was used as the stream-sediment sample,

whereas a coarser, -20 mesh (0.8 mm) fraction was

addition to the stream sediments, glacial debris

was analyzed. For the purposes of this study

used for the heavy-mineral concentrate sample. In

from lateral and medial moraines of valley glaciers

was collected at 109 sites and the -80 mesh fraction

analytical data from the glacial debris samples were

combined with those from stream sediment because

that these two media are chemically similar. The

stream sediments, glacial debris, and the heavy-

statistical analysis of the analytical data showed

mineral concentrates are composed mainly of detrital material that has been mechanically introduced into

a stream or moraine from the bedrock and colluvium

of the stream sediment and glacial debris approxi-

reflect the presence of mineralized rock in the

mates that of the weathering rock and soil material

within the basin. Further, all the sample types can

drainage basin upstream. The heavy-mineral concen-

trates are especially useful for determining the distribution of certain heavy metals and resistate minerals such as gold, cassiterite, and scheelite.

within a particular drainage basin. The composition

most of these streams ranges in size from fine sand

to pebbles and cobbles. A -80 mesh fraction of this

mineral concentrates were collected from the active

and nickel as defined on the histograms.

anomalous values in stream sediments and large

showing the topography, generalized geology, and sample sites. The sample sites are represented by

These geochemical maps show results of reconnais-

Anomalous values -- Size of symbol denotes percentage

Background values -- Represent sample localities where

Thrust or high-angle reverse fault; sawteeth on upper plate

concentrate

SAMPLE SITES

MARBLEIZED LIMESTONE, CHERT, AND SHALE

INTRUSIVE AND ULTRAMAFIC ROCKS

GEOLOGIC SYMBOLS

CONTINENTAL SEDIMENTARY ROCKS -- Includes Kenai Group

UNCONSOLIDATED SEDIMENTARY DEPOSITS

SILURIAN AND ORDOVICIAN

DESCRIPTION OF MAP UNITS

INTRUSIVE AND UL-TRAMAFIC ROCKS

Tf } Middle Tertiary

Tmk } Lower Tertiary

prepared in the field by panning to remove most of the light minerals. The panned samples were sieved through a 20 mesh (0.8 mm) screen in the laboratory and the -20 mesh fraction was further separated with bromoform (specific gravity, 2.86) to remove the remaining lightmineral grains. Initially, magnetite and other strongly magnetic heavy minerals were removed from the heavymineral fraction by the use of a hand magnet. The remaining heavy minerals were passed through a Frantz Isodynamic Separator and a nonmagnetic fraction was obtained at a setting of 0.6 amperes. A split of this fraction was pulverized and analyzed by the semiquantitative spectrographic method used for analyzing the stream sediment and glacial debris (Grimes and Marranzino, 1968). The remaining split of the nonmagnetic fraction was examined under the microscope for its mineralogical composition. Although a pure nonmagnetic fraction cannot be obtained owing to the presence of locked polymineralic grains, the nonmagnetic concentrates contain mainly muscovite, sphene, zircon, apatite, rutile,

anatase, and tourmaline. Ore minerals such as gold, sulfides, scheelite, and cassiterite are also found in this fraction. Analytical data for stream sediment, glacial debris, and nonmagnetic heavy mineral concentrates are available in U.S. Geological Survey Open-File Rept. 78-146 (O'Leary and others, 1978).

¹The use of trade names is for descriptive purposes only and does not constitute endorsement of these

products by the U.S. Geological Survey.

and nickel values.

geochemical anomalies

The most notable pattern of associated chromium and nickel anomalies is the northeast-southwest trend in the western part of the quadrangle. High chromium values and weakly anomalous nickel values, which occur in both stream sediments and heavy-mineral concentrates, are spatially associated with a belt of composite plutons (Reed and Nelson, 1977), which are shown as TKi on the generalized geologic map. The larger and better exposed plutons within this belt are composite in nature and consist of distinctly different compositions that range from peridotite to granite. The peridotite is the most likely source of the high chromium

West of the Yentna Glacier (T. 30 N., R. 13 and 14 W.) high chromium and nickel values were determined in sediment and heavy-mineral concentrate samples collected from streams draining an irregular body of dunite (MzPzu). The source of the high chromium values is probably disseminated chromite which was seen in the dunite (Reed and others, Table 1, no. 26, 1978).

Stream sediment and heavy-mineral concentrate samples collected from drainages on the west side of the Lacuna Glacier, where several chromite-bearing dunite sills are present (T. 31 N., R. 12 W.), contained background amounts of chromium (20-200 ppm in stream sediment; 100-700 ppm in heavy-mineral concentrate). The lack of anomalous amounts of chromium in the nonmagnetic fraction of the heavy-mineral concentrates may reflect the removal of chromite, a weakly magnetic mineral, from the heavy-mineral samples during magnetic separation. In addition, the relatively low chromium content of the sediment samples suggests that the contribution of chromite-bearing material to the total sediment load is small. The low values also suggest that sediment is diluted, at least in part, by barren material from the lateral moraine of the Lacuna

The highest nickel value (>5,000 ppm) is in a heavy-mineral concentrate of glacial debris collected in the south part of the Cathedral Spires pluton (T. 27 N., R. 18 W.). This sample and two others collected from the south edge of the pluton contain, in addition to nickel, anomalous arsenic, silver, bismuth, cobalt, beryllium and tin. Further, the samples contain high values of lead, copper and gold. This metal suite suggests that there have been at least two mineralizing events in the area; one event in which nickel and cobalt were introduced, and another which resulted in the introduction of tin, beryllium, and possibly, the other metals.

North of the Denali Fault (T. 32 N., R. 15 W.), the source of the high chromium and nickel values in heavy-mineral concentrates is probably the small body of serpentinite (MzPzu) located southeast of Heart Mountain. Float samples of serpentinite collected in this area contain veins and irregular segregations of pyrite, chalcopyrite and pentlandite(?) (Reed and others, 1978, Table 1, no. 11).

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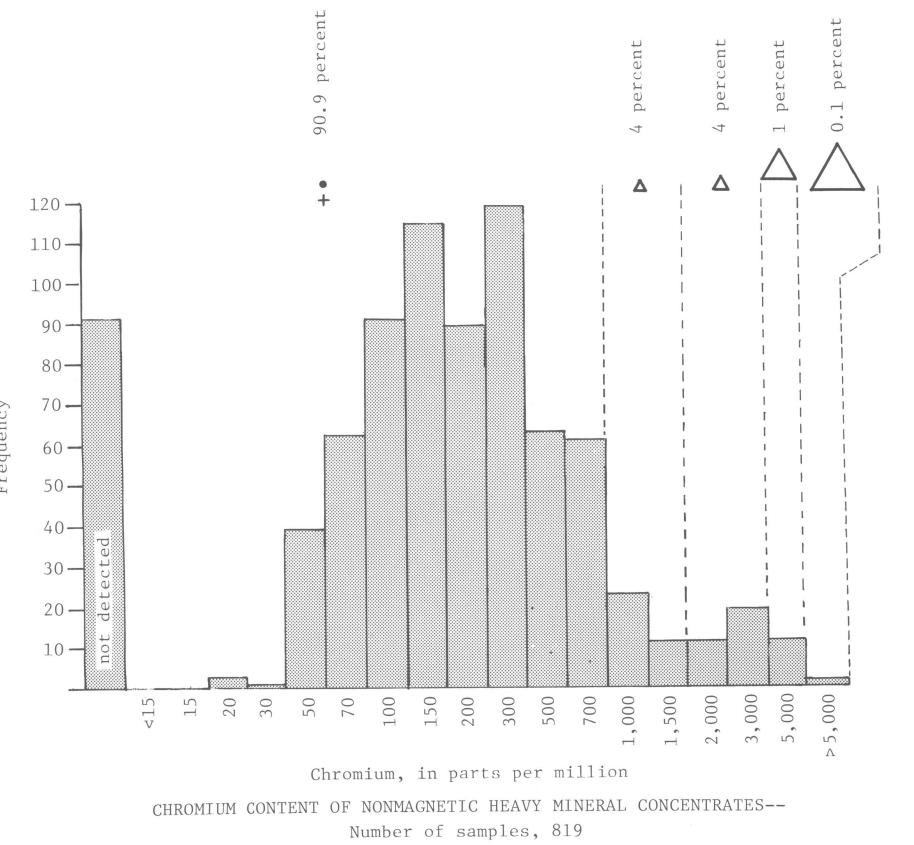
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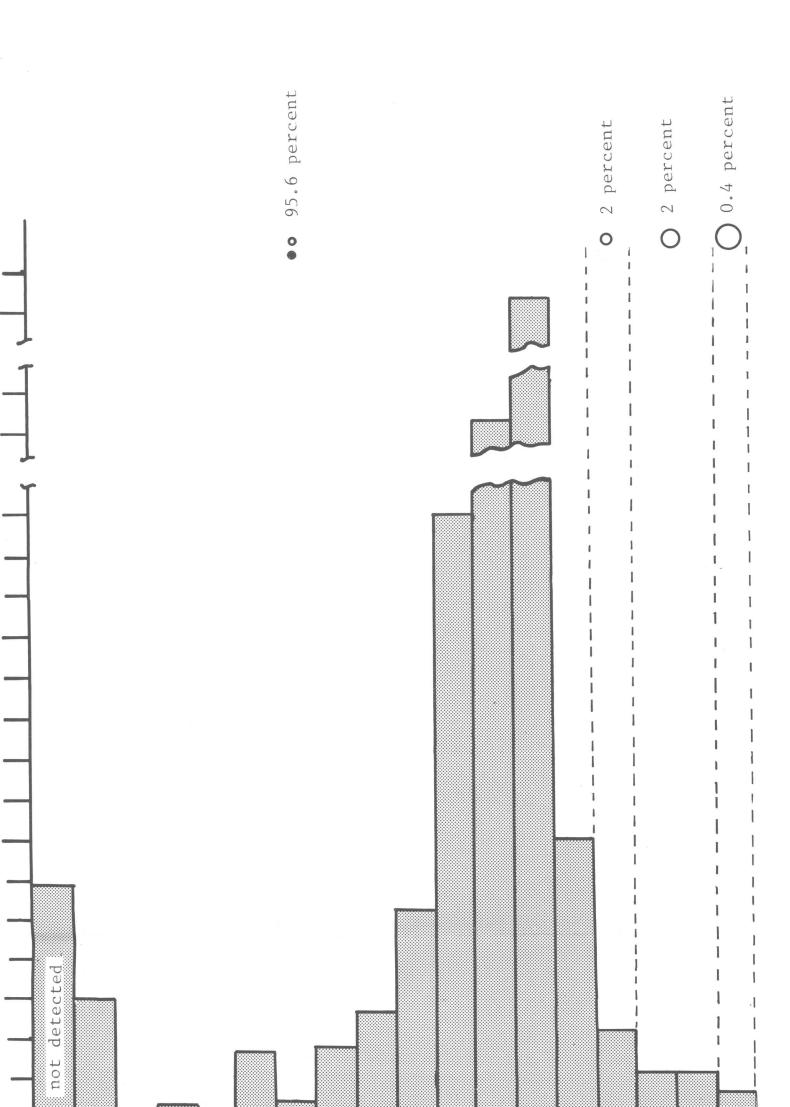
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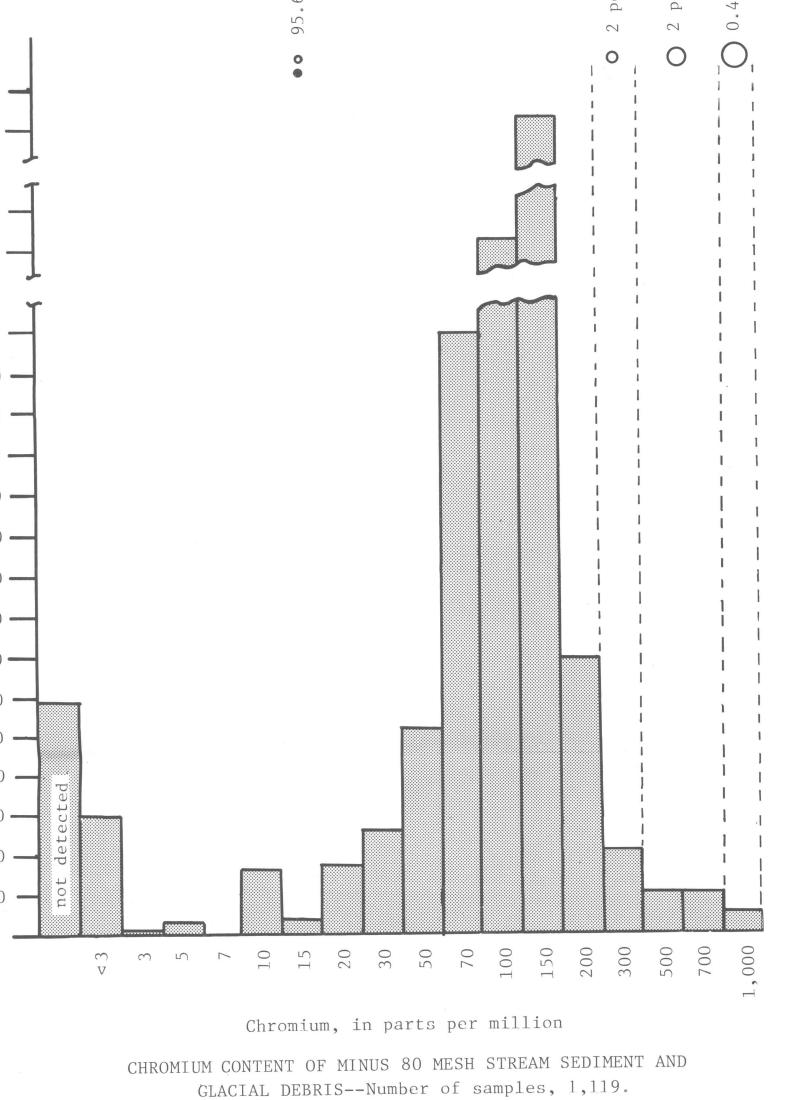
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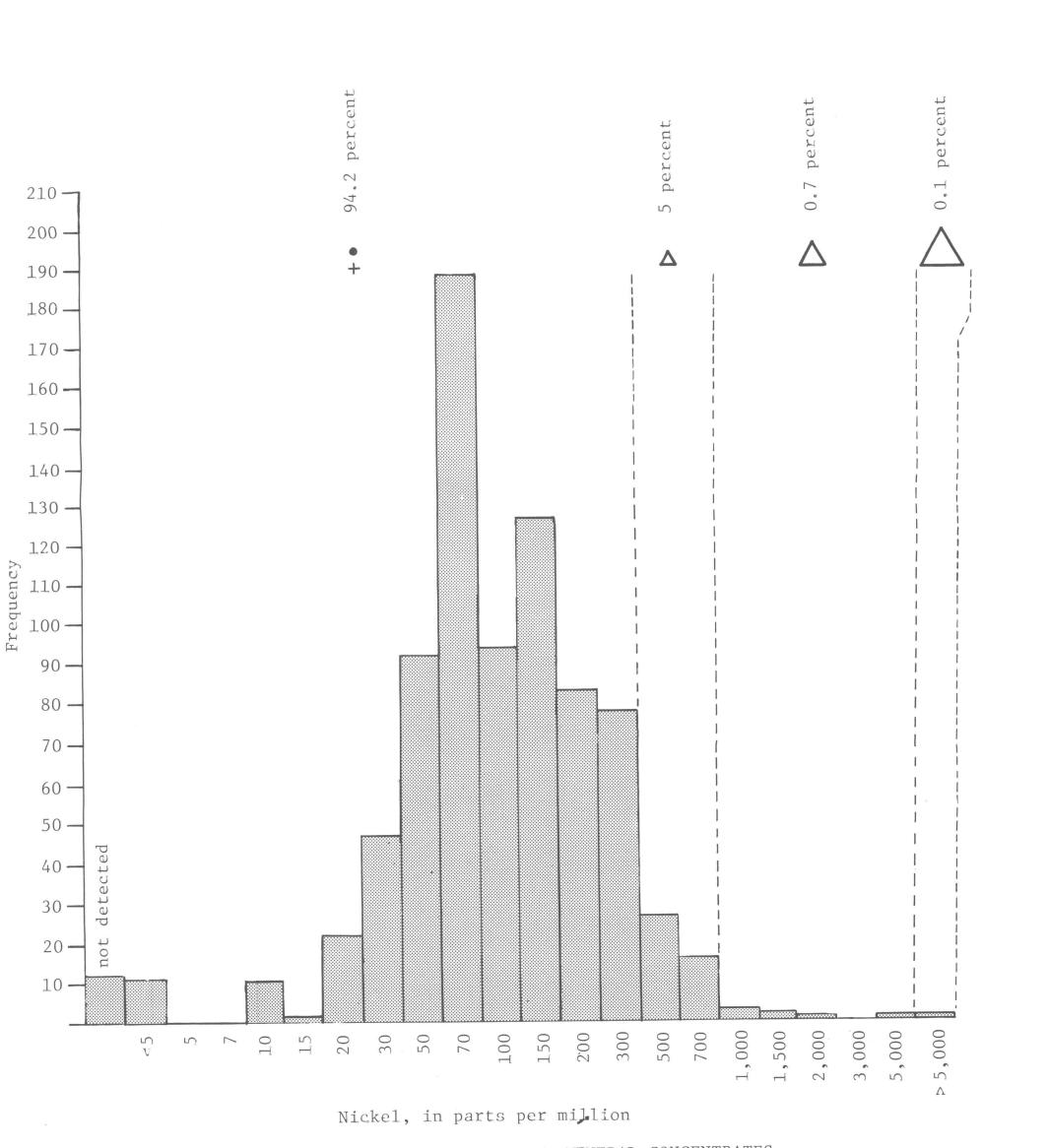
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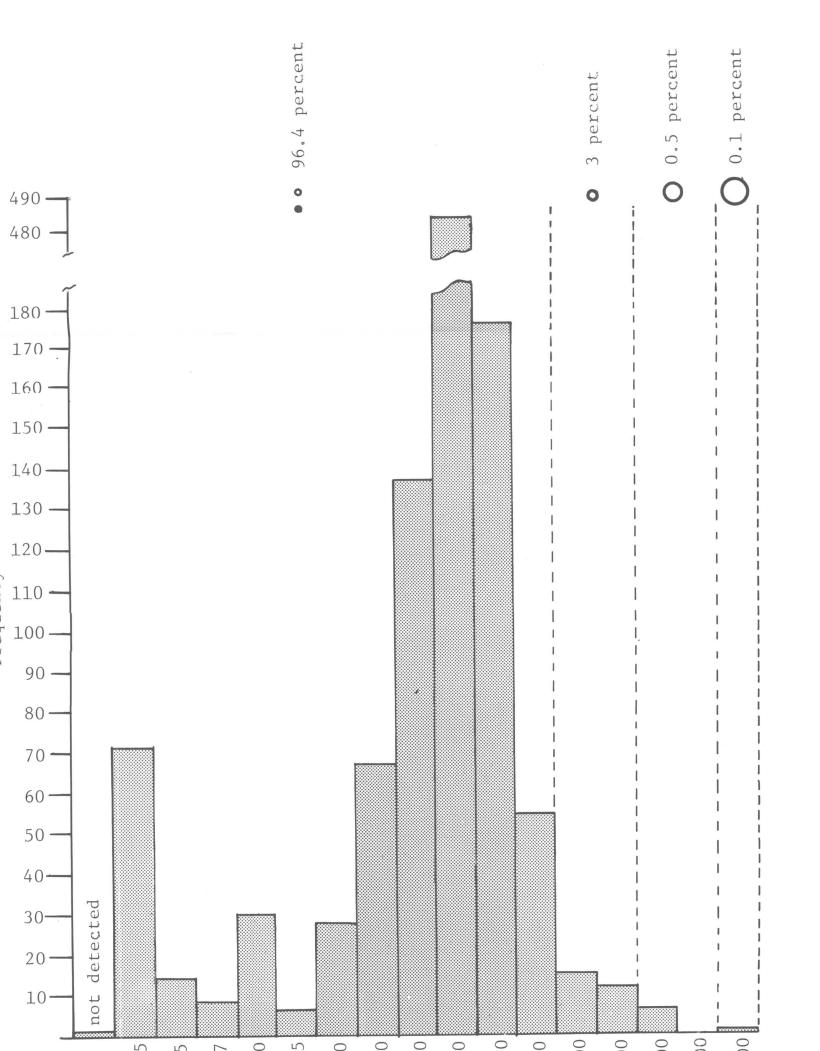
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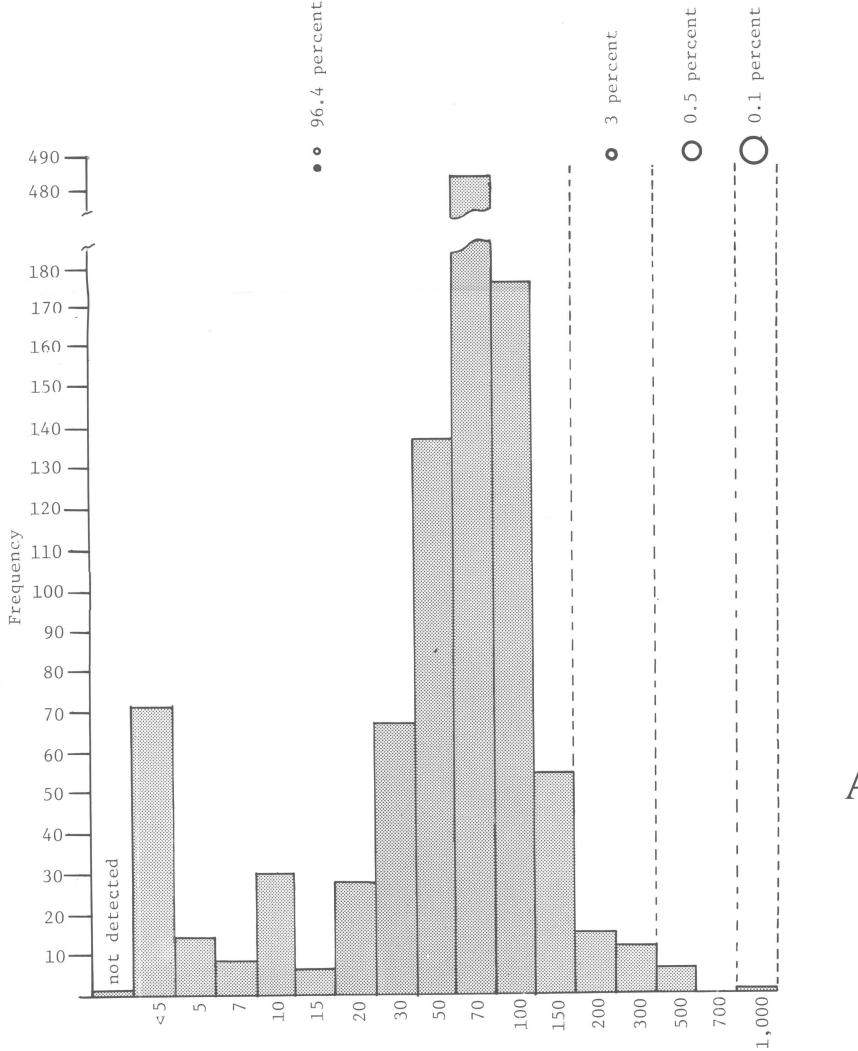












Nickel, in parts per million

NICKEL CONTENT OF MINUS 80 MESH STREAM SEDIMENT AND

GLACIAL DEBRIS--Number of samples, 1,119.

Geology generalized from Reed and Nelson, 1977

GEOCHEMICAL AND GENERALIZED GEOLOGIC MAPS SHOWING DISTRIBUTION AND ABUNDANCE OF CHROMIUM AND NICKEL IN THE TALKEETNA QUADRANGLE, ALASKA

DEPARTMENT OF THE INTERIOR

Base from U.S. Geological Survey, 1958

Base from U.S. Geological Survey, 1958